Appendix A:
Notes on Data Collection

NOTES ON DATA COLLECTION

This compendium of key data on the state of the Bay Area transportation system is intended to provide the best snapshot possible, given existing information collected by Bay Area transportation agencies. Because the data have been gathered by multiple sources, responding to varying requirements, differences exist with respect to methodology, frequency, time period covered, level of detail and other variables. Following are some general comments, plus specific discussions of data by category.

Time Period Covered

Most data is collected and reported by calendar year (January 1 to December 31). Transit data is collected and reported by state fiscal year (July 1 to June 30), as is the custom for accounting purposes. Every effort was made to assemble consistent data for the five-year period 2001 through 2005 (or, for data collected by fiscal year, 2000-01 through 2004-05).

Future Data Collection

Emerging technologies are beginning to make more complete data available and promise to contribute even more significantly in the future. Examples of emerging data collection technologies that are expected to improve data in future reports include the following:

- Sensors embedded in the pavement and on the roadside of many Bay Area freeways already continuously count vehicles and monitor travel speeds on freeways. Automated data from these sensors is available 24 hours a day, 365 days a year. This gives us a much more accurate understanding of roadway conditions compared to areas not yet equipped with sensors, where traffic counts are taken just a few days a year. Caltrans has developed the ability to use traffic data from these sensors, where in place, to measure traffic congestion. When installation of these in-pavement sensors is complete, it will be possible to report on congestion over the entire freeway system.

- Data collected through the 511 Driving Times℠ system, which uses FasTrak® electronic toll tags installed in autos and trucks to estimate the time it takes to travel between fixed points on the freeway, may supplement that from in-pavement sensors. In the *State of the System 2006* report, we have used data from in-pavement sensors to report average travel time and buffer time, a measure of travel time reliability, for selected freeway trips. These systems also allow measurement of variations in travel time on weekdays and weekends, and to account for congestion caused by road construction and collisions.

- Cities are deploying "smart" traffic signal systems that continuously count vehicles on local roadways. These systems are deployed on only a small subset of streets, however. Most traffic counts on local roadways will continue to be done by traditional methods on an occasional basis.

- Transit agencies' fleet management systems will track the times that buses and trains arrive and depart transit stops. By comparing these times to transit schedules, the fleet management systems will generate more complete on-time performance statistics.

Data Collection Techniques Used for This Report

System in Brief

Population and Employment Trends *(page 3)*

Population data is taken from California Department of Finance estimates. The estimates in this report reflect population as of July 1 of each year. City and county population estimates are available at: www.dof.ca.gov/HTML/DEMOGRAP/ReportsPapers/Estimates/E1/E-1text.asp

Employment data is taken from the California Employment Development Department (EDD) "Wages and Salary" data series. EDD estimates annual employment by industry based on reports by employers. Self-employed workers, unpaid family workers, private household workers and individuals on unpaid leave from work are not included in the data. Because it is the number of jobs rather than workers that is reported, workers holding more than one job may be counted more than once. Employment data is published on the EDD Web site at: www.labormarketinfo.edd.ca.gov/cgi/databrowsing/?PageID=4&SubID=171

Commute Mode Share *(page 4)*

The U.S. Census Bureau collects data on commute behavior including mode of travel. In 2000, the Census Bureau began a pilot program, called the American Community Survey, to collect data on an annual basis rather than a 10-year cycle. The American Community Survey collects all the information currently measured by the decennial census long form, including commute characteristics. Advantages of the American Community Survey over the decennial long form include annual updates and faster release of data. Disadvantages include a smaller sample set and potentially less-accurate results than the decennial census. However, the sample size for the American Community Survey still far surpasses any other surveys of commute behavior and thus is believed to be the most accurate information available. The American Community Survey began full implementation in 2005. Data collected by the U.S. Census Bureau is available at: factfinder.census.gov/home/saff/main.html?_lang=en

Mobility: Getting Around the Bay Area

Freeway Congestion *(pages 8–11)*

The measure used to indicate congestion is daily vehicle hours of delay. Delay occurs when the average speed falls below 35 miles per hour for 15 minutes or more. This data has been collected every year since 1981 (except for 1985 and 1997, when budget limitations forced Caltrans to forgo the program). Trained personnel drive specially equipped vehicles on the freeway system during morning and evening commute hours to collect information on average travel speeds and travel times, which is then used to calculate daily delay. Data is collected on Tuesdays, Wednesdays and Thursdays during the spring and fall of each year. Due to budget limitations in 2004 and 2005, congestion monitoring was performed for only the most congested portions of the region's freeway system, which account for approximately 60 percent of congested miles and 75 percent of total delay.

Commute Reliability *(pages 12–15)*

State of the System 2006 reports for the first time on the reliability of driving commutes in the Bay Area. Traffic speed data is collected by automated sensors in the freeway pavement throughout the course of a year. On freeway segments with good sensor coverage, speed data for typical weekdays (Tuesday, Wednesday and Thursday) can be used to calculate average start-to-finish driving times for a given trip as well as the buffer times needed to complete 95 percent (19 out of 20) of these peak period trips on schedule. The data used to calculate average commute time and reliability can be accessed at pems.eecs.berkeley.edu/ For this report, commute reliability is presented for the morning and evening commutes for seven origin and destination pairs. Future *State of the System* reports are expected to provide a more complete picture of Bay Area commute reliability by encompassing a larger number of freeway commute segments.

Toll Bridge Traffic *(pages 16–17)*

The Bay Area Toll Authority (BATA), which oversees the collection of tolls on state-owned bridges in the Bay Area, tracks the number of vehicles crossing each of the seven state-owned bridges. Traffic counts reflect vehicle crossings in the tolled direction for accounting purposes. BATA also tracks the percentage of vehicles that pay tolls by means of the FasTrak® electronic toll collection system. The Golden Gate Bridge, Highway and Transportation District tracks traffic and FasTrak® usage for the Golden Gate Bridge. The average daily traffic for each bridge is the total annual traffic divided by 365 days. Data on traffic, revenue and FasTrak® usage for the seven state-owned bridges is available on the Bay Area Toll Authority Web site at: bata.mtc.ca.gov/tolls/index.htm Data on traffic, revenue and FasTrak® usage for the Golden Gate Bridge is available on the Web at: www.goldengatebridge.org/research/GGBTraffToll.php

Carpool Lanes — Time Savings and Usage *(pages 18–21)*

Caltrans District 4 collects data on carpool-lane usage and travel-time savings annually. Data on lane usage is compiled from direct observations by people situated on the side of the freeway adjacent to the carpool lanes. Travel-time savings are computed by comparing travel time in the carpool lane with that in the adjacent mixed-flow lanes during the peak morning and evening commute hours. For carpool lanes that are not congested, travel time is based on the speed limit on the free-

way. For carpool lanes that are congested, Caltrans drives specially equipped "floating cars" to record travel time and speed. The same "floating car" technique is used to measure the travel time in adjacent mixed-flow lanes. Caltrans District 4 annually publishes a report with complete data on carpool-lane usage and travel-time savings. This report also includes detailed information on the hours of operation, number of people using the carpool lane compared to adjacent general purpose lanes, and violation rates. The Caltrans District 4 reports can be found at: www.dot.ca.gov/dist4/reports.htm

Local Traffic *(pages 22–23)*

Under state law, county congestion management agencies are charged with monitoring congestion on local roadways. Two Bay Area counties, Sonoma County and Napa County, have exercised an option in the law to opt out of this requirement. The remaining seven counties monitor congestion on local roadways and publish the results at least every two years in a county congestion monitoring report. Most counties report in odd-numbered years; Alameda, Contra Costa and Santa Clara counties typically report in even-numbered years.

County congestion management agencies measure local roadway congestion by calculating the "level of service" on a selected set of high-priority roads during peak commute periods. Level of service describes traffic conditions based on speed and travel time, volume and capacity, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. Level of service is expressed in grades from A through F, with level of service A representing the best operating conditions and level of service F the worst. At level of service A, B and C, traffic flows smoothly and delay is minimal. This report characterizes these conditions as "uncongested." At level of service D and E, traffic flow becomes unstable, conditions characterized in this report as "moderately congested." At level of service F, traffic is stop-and-go, characterized in this report as "severely congested."

The level of service grade is based on delay experienced by vehicles traveling through major intersections or on average travel speeds over selected segments of local roadways. The procedures for monitoring local roadway level of service are established on a county-by-county basis. Thus, it is more appropriate to compare the results for each county from year to year than to compare results across different counties. Links to congestion management agencies for counties in the Bay Area may be found on the MTC Web site at: www.mtc.ca.gov/links/regional.htm

Transit On-Time Performance *(pages 24–25)*

Transit operators monitor on-time performance as a measure of the quality of the service they provide. Like most data on transit operations, on-time performance is reported by fiscal year. Data usually is collected by persons who record the arrival time of individual transit vehicles at key stops. (BART's central computer system automates collection of on-time performance data.) On-time performance data is used by operators primarily as an internal management tool. When deteriorating on-time performance can be traced back to increasing roadway congestion, the data may be used to develop more realistic, revised schedules. San Francisco Muni publishes on-time performance data in its quarterly performance reports as required under Proposition E, passed by San Francisco voters in 1999.

Transit Ridership *(pages 26–27)*

This report uses transit boardings as a measure of ridership. A boarding refers to each time a passenger enters a transit vehicle or train station. One person may board multiple vehicles to complete a trip. Methods used to collect this ridership data include tracking transit fare receipts and hiring people to count passenger boardings. Transit operators report ridership for each fiscal year to the Federal Transit Administration for inclusion in the National Transit Database. National Transit Database publications and data can be found at: www.ntdprogram.com/ntdprogram/ MTC summarizes transit ridership and other operating statistics for Bay Area operators in its annual report, *Statistical Summary of Bay Area Transit Operators,* which covers a rolling five-year period and may be viewed at: www.mtc.ca.gov/library/statsum/statsum.htm

Safety

Motor Vehicle Collisions and Motor Vehicle Collisions Involving Pedestrians or Cyclists *(pages 32–33)*

The California Highway Patrol (CHP) maintains the most complete data on motor vehicle collisions, including those that involve pedestrians or cyclists. The database, called Statewide Integrated Traffic Records System, includes injuries and fatalities resulting from all collisions reported to local law enforcement as well as to the Highway Patrol. The Highway Patrol publishes the series *Annual Report of Fatal and Injury Motor Vehicle Traffic Collisions,* which includes summary statistics by county and for the entire state. This is available on the Web at: www.chp.ca.gov/html/publications.html Data at a less aggregated level can be requested from the CHP.

State of Repair

State Highway Pavement Conditions *(pages 36–37)*

Caltrans conducts an annual survey of the pavement condition on all state-owned roads in California. Roads are inspected visually for potholes and cracks that indicate damage to the road structure lying beneath the pavement. In addition, Caltrans measures the comfort of the ride on the pavement using roving vehicles that measure the smoothness of the road. Because road structure and ride quality are not always positively correlated — for example a road with poor ride quality may not have any structural damage — both factors are considered in determining which roads are in need of repair. The results of the pavement condition survey are published by Caltrans in the State of the Pavement report series published by the Caltrans Division of Maintenance and available at: www.dot.ca.gov/hq/maint/roadway.htm Pavement condition data is reported by calendar year.

Local Roadway Pavement Conditions *(pages 38–39)*

Most Bay Area jurisdictions use MTC's Pavement Management System, or an equivalent system, to track conditions of streets and roads and develop cost-effective repair schedules. MTC's Pavement Management System measures pavement conditions according to a pavement condition index (PCI) that ranges from 0 to 100, where 100 is the best possible score. Surveyors record the type and severity of pavement distress, such as cracking, weathering and patching through physical inspections. This information is then entered into the Pavement Management System to calculate the PCI.

The characterization of pavement conditions in 2005 is based on the most recent data submitted to MTC by local jurisdictions. For those jurisdictions (64 in number) that had their last inspections done in 2005, the PCI scores were considered current. For the remaining jurisdictions — those whose most recent inspections were done in years prior to 2005 — MTC staff used its Pavement Management System software to project PCI scores forward to 2005, relying on estimates (provided by individual jurisdictions or by the State Controller's Office) of revenue available to each jurisdiction for local roadway maintenance.

Transit Service Calls *(pages 40–41)*

A service call occurs any time transit service is disrupted because a transit vehicle cannot complete a scheduled trip or cannot start the next scheduled trip. Transit operators report total service calls to the Federal Transit Administration as part of the National Transit Database. Operators also report the miles of service provided annually (annual revenue service miles) as part of the National Transit Database. MTC uses these data to calculate the total number of service calls per million miles of service provided by the seven largest bus and rail operators. National Transit Database data and reports may be found at: www.ntdprogram.com/ntdprogram/

Airports and Seaports

Airport Passenger and Cargo Volumes *(pages 44–45)*

Statistics on airport passengers are based on information supplied to the airports from the airline carriers' computer reservation systems. These numbers are in turn used to collect landing fees from the carriers and for planning efforts at the airports. Statistics on air cargo are reported by private carriers to the airports. Private carriers (e.g., Federal Express, UPS) submit tonnage reports to the airports for planning and billing

purposes. Much of this data is made available on the Web by the three major Bay Area airports.

Seaport Marine Cargo Volumes *(pages 46–47)*

Private operators at the ports collect data on marine cargo. For bulk goods, tonnage is tracked and used by the ports to collect fees. For containers, fees are paid to the port based on the contents of the containers and the number of total containers is tracked for planning purposes.